REMARKS/ARGUMENTS

Applicant has received the Office Action dated August 13, 2008, in which the Examiner: 1) rejected claims 1-37 under 35 U.S.C. § 112 as being allegedly indefinite; 2) rejected claims 1-11, 14, 15, 17, 20-27, 30, 31, 33, 36, and 37 under 35 U.S.C. § 103(a) as being unpatentable over Yan et al. (U.S. Pat. No. 6,975,750, hereinafter "Yan") in view of Tian et al. (U.S. Pat. No. 6,879,709, hereinafter "Tian"); 3) rejected claims 12, 13, 16, 19, 28, 29, 32, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Yan and Tian in further view of Geng (U.S. Pat. No. 7,221,809, hereinafter "Geng"); and 4) rejected claims 18 and 34 under 35 U.S.C. § 103(a) as being unpatentable over Yan and Tian in further view of DeCarlo et al., "The Integration of Optical Flow and Deformable Models with Applications to Human Face Shape and Motion Estimation," hereinafter "DeCarlo."   With this Response, Applicant has amended claims 1 and 3-37, and cancelled claim 2. Based on the amendments and arguments contained herein, Applicant believes this case is in condition for allowance.

I. REJECTIONS UNDER 35 U.S.C. § 112

The Examiner is of the opinion that claims 1-37 recite "systems" that are improperly defined by process steps rather than structural elements. Additionally, the Examiner alleges that claims 14 and 15 recite "mark(s)," which has no antecedent basis in the Specification.

Claims 1 and 3-37 have been rewritten as method claims in accordance with the Examiner's suggestion. Applicant respectfully submits that amended claims 1 and 3-37 now recite "methods" that are properly defined by process steps.

Additionally, claims 14 and 15 have been amended to recite "mask(s)" instead of "mark(s)" to impart antecedence thereto, in accordance with the Examiner's suggestion.

Hence, Applicant submits that claims 1 and 3-37 as amended, distinctly and clearly define the invention therein. Withdrawal of rejections to claims 1 and 3-37 under 35 U.S.C. § 112 is therefore respectfully requested.

II. REJECTIONS UNDER 35 U.S.C. § 103

A. Claims 1, 20, and 37

Applicant respectfully submits that amended independent claims 1, 20 and 37 are not rendered obvious by Yan in view of Tian. Specifically, amended claim 1 recites a face recognition and/or verification method wherein a person's actual face is registered. An image of

the actual face is captured and synthesized to create a plurality of face prototypes. The face prototypes represent possible appearances of the actual face under various lighting conditions, varying facial expressions, varying facial orientations, and/or modeling errors. The face prototypes are stored for later analysis and comparison with a captured image to be recognized or verified. At least one of translational, rotational and scalar transformations is applied to the captured actual face image for normalization thereof.

Amended claim 20 recites a facial prototype synthesis method wherein an image of a person's actual face is initially normalized by applying at least one of translational, rotational and scalar transformations thereto for subsequently creating a plurality of face prototypes. The face prototypes represent possible appearances of the actual face under various lighting conditions, varying facial expressions, varying facial orientations, and/or modeling errors. The face prototypes are stored for later use.

Amended claim 37 recites a facial prototype synthesis method wherein an image of a person's actual face is normalised by applying at least one of translational, rotational and scalar transformations to the captured actual face image, and synthesized by determining possible alternative eye positions and applying at least one mask to the image to create a plurality of face prototypes. The face prototypes represent possible appearances of the actual face under various lighting conditions, varying facial expressions, varying facial orientations, and/or modeling errors.

Yan discloses a system and method for face recognition using a synthesized training image. The system and method includes a virtual human face generation technique which synthesizes images of a human face at a variety of poses using, preferably, a frontal and profile image of a specific subject. An automated deformation technique is used to align the features of a generic 3D face model with the features of the face of the subject, resulting in a 3D face model of the subject. Following that, the model is smoothed and endowed with photometric details using subdivision spline surface construction and multi-direction texture mapping techniques. 2D images of the subject at a variety of poses are generated thereafter.

Tian discloses a system and method for automatic detection of neutral expressionless faces in digital images and video. A face is detected and its facial features are normalized to a standard size face in canonical position.

The Examiner has admitted that normalization of the captured actual face image by applying at least one of translational, rotational and scalar transformations is not disclosed in Yan. (Office Action, p. 3). The Examiner is however, of the opinion that the disclosure in Tian that the need for normalization as a preprocessing step for face recognition and facial expression analysis to compensate for variations such as position, pose, scale and illumination, renders claim 1 obvious, in light of Yan.

The Applicant submits that the normalization, as disclosed in Tian, is applied to a novel face during face recognition for matching with the face prototypes instead of being applied to the actual face image only during face recognition. This being apparent from the recitation of Tian that face normalization is a necessary preprocessing step for face recognition and facial analysis.

Therefore, a person having ordinary skill in the art of image processing and knowledge of Tian would have instead normalized the novel face obtained during face recognition for matching with prototype images (from a database) generated from an un-normalized actual face image during image registration.

Knowledge of Tian would have further distanced the person having ordinary skill in the art from amended claim 1 of the Applicant's application which describes normalization of the actual face image prior to the generating prototype images therefrom during image registration.

The Applicant respectfully submits that even though the Examiner appears to be of the opinion that normalization is an ubiquitous technique on the basis of the disclosure provided in Tian, such a disclosure only indicates that a person having ordinary skills in the art would also be sufficiently skilled to answer the question "what is normalization?". However, the person's ordinary skills would not be sufficient to address a question on how normalization can be applied to achieve a certain effect.

Apart from the fact that the normalization technique as recited in amended claim 1 distinguishes amended claim 1 from Yan and Tian, the Applicant respectfully reiterates that the face prototypes as recited in amended claim 1, represent possible appearances of the actual face under various lighting conditions, varying facial expressions, varying facial orientations, and/or modeling errors. Although Examiner is of the opinion these features have been disclosed in Yan, the Applicant submits that Yan proposes a face recognition technique by importing the facial

features of the subject onto a generic 3D face model and synthesizing 2D images of the subject at various poses thereafter.

In contrast, the present invention as claimed in amended claims 1 uses a different approach by modeling the possible errors of the actual face when the plurality of face prototypes are created during the registration of the actual face. The face prototypes are stored for later analysis and comparison with a captured image to be recognized or verified. When the probability of errors is taken into consideration during the initial capture, the robustness of the recognition system in handling changing conditions is improved. Yan and Tian, individually or collectively, do not teach or intimate taking the probability of errors during the initial capture into consideration for the purpose of improving the robustness of the recognition system.

Amended independent claims 20 and 37, both of which include the above discussed features of amended claim 1, can also be distinguished from Yan and Tian for the reasons given above with regard to claim 1. Furthermore, in opining that claims 20 and 37 are obvious in light of Yan and Tian, the Applicant respectfully submits that the Examiner did not take into consideration the fact that the invention as recited by claims 20 and 37 uses a different approach from Yan and Tian by modeling the possible errors of the actual face when the plurality of face prototypes are created during the registration of the actual face, and is hence obscured from the inventive step of the invention as recited by claims 20 and 37.

Hence, the Applicant respectfully submits that in accordance to the above response explaining that the inventions as recited in amended claims 1, 20 and 37 are not disclosed independently or collectively by Yan and Tian, a person having ordinary skill in the art when combining Yan and Tian would not be able to arrive at the inventions of amended claims 1, 20 and 37.

Therefore in accordance with the above response, Applicant respectfully submits that claims 1, 20, and 37 are allowable over the cited art.

B. Claims 3-11, 14, 15, 17, 21-27, 30, 31, 33 and 36

Applicant respectfully submits that in accordance to the above response explaining that since the invention as recited in each of amended independent claims 1 and 20 are not disclosed independently or collectively by Yan and Tian, the invention as recited in each of amended

claims 1 and 20 would not have been available to a person skilled in the art at the time of invention.

Without the availability of the method of each of claims 1 and 20, a person skilled in the art at the time of invention would not have the knowledge of the method of each of claims 1 and 20 to improve upon to arrive at each of amended claims 3-11, 14, 15, 17, 21-27, 30, 31, 33 and 36.

Furthermore, with respect to the mention of eye positions in amended claims 6-8, 10, 11, 22 -24, 26 and 27, the Applicant submits that the mention of different eye positions in Yan is of a different context, this being apparent from the fact that the system and method in Yan do not assume that there is an error during the initial detection. The system disclosed in Yan synthesizes the 2D images (of various poses) based on the initial detection and does not take into consideration the probability of an error during the initial detection.

At least because each of claims 3-11, 14, 15, 17, 21-27, 30, 31, 33 and 36 depend from one of claims 1 and 20, and for the additional reasons given above, Applicant respectfully submits that claims 3-11, 14, 15, 17, 21-27, 30, 31, 33 and 36 are allowable over the cited art.

C. Claims 12, 13, 19, 28, 29, 32 and 35

Applicant respectfully submits that in accordance to the above response explaining that since the invention as recited in each of amended claims 1 and 20 are not disclosed independently or collectively by Yan and Tian, the invention as recited in each of amended claims 1 and 20 would not have been available to a person skilled in the art at the time of invention.

Without the availability of the method of each of claims 1 and 20, a person skilled in the art at the time of invention would not have the knowledge of the method of each of claims 1 and 20 to improve upon to arrive at each of amended claims 12, 13, 19, 28, 29, 32, and 35.

Geng fails to satisfy the deficiencies of Yan and Tian explained above with regard to claims 1 and 20, from one of which each of claims 12, 13, 19, 28, 29, 32, and 35 depend.

 For at least these reasons Applicant respectfully submits that claims 12, 13, 19, 28, 29, 32, and 35 are allowable over the prior art.

D. Claims 18 and 34

Applicant respectfully submits that in accordance to the above response explaining that since the invention as recited in each of amended claims 1 and 20 are not disclosed independently or collectively by Yan and Tian, the invention as recited in each of amended claims 1 and 20 would not have been available to a person skilled in the art at the time of invention.

Without the availability of the method of each of claims 1 and 20, a person skilled in the art at the time of invention would not have the knowledge of the method of each of claims 1 and 20 to improve upon to arrive at each of amended claims 18 and 34.

DeCarlo fails to satisfy the deficiencies of Yan and Tian explained above with regard to claims 1 and 20 from which claims 18 and 34 respectfully depend. For at least these reasons Applicant respectfully submits that claims 18 and 34 are allowable over the prior art.

CONCLUSION

Applicant respectfully requests reconsideration and that a timely Notice of Allowance be issued in this case. Applicant believes a three-month extension of time is needed and thus requests the time extension. In the event that an additional extension of time is necessary to allow for consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Conley Rose, P.C.'s Deposit Account No. 03-2769 for such fees.

Respectfully submitted,

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